UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

DEC 21 1989

MEMORANDUM

SUBJECT: Pyridate New Chemical Registration Standard EFGWB Science Chapter

TO: Robert Taylor, Product Manager

THRU: Henry Jacoby, Chief
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division

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Review Section 1

FROM: Richard J. Mahler, Chemist
Review Section 1

Attached is the EFGWB Science Chapter for the Pyridate New Chemical Registration Standard. It includes the Task 1 (Review of Individual Studies), Task 2 (Environmental Fate Summary and Ground Water Assessment) and the Data Tables (Table A, Subdivision N Environmental Fate Data Requirements).

Pyridate is a postemergent contact herbicide that is currently used in Europe and Asia to control broadleaf and some grassy weeds in cereals, corn and some other crops. Single active ingredient formulations include 45% WP and 3.75 lb/gal EC. Pyridate may be applied at 0.5-1.4 lb ai/A using a boom sprayer. It is believed that the herbicide acts by inhibiting the Hill reaction of photosynthesis.

The only data requirements that have been satisfied are hydrolysis, aerobic soil metabolism and accumulation in fish. Data requirements for leaching and adsorption/desorption are partially fulfilled. Data concerning the mobility of unaged pyridate in four soils and aged pyridate residues in one soil are still required. Supplemental data consists of one of the four terrestrial field dissipation studies, aerobic aquatic metabolism and confined accumulation in rotational crops. Laboratory and field volatility requirements were previously waived based on results that show pyridate and its main degradate, CL-9673, have very low vapor pressures.

The following studies are required to satisfy the Subdivision N Environmental Fate Data Requirements for use on terrestrial food crops only:

photodegradation in water and soil, anaerobic soil metabolism, field dissipation and confined rotational crops.

The following studies may be required if the registrant seeks registration for use on rice: anaerobic aquatic, aerobic aquatic, aquatic sediment and accumulation in irrigated crops.

The following studies are reserved based on the results of other required studies: long term soil dissipation, field rotational crops, and accumulation in aquatic non-target organisms.

Since available data are insufficient, final environmental fate and ground water leaching assessments cannot be made; however, some preliminary estimations or potential risks are as follows:

ENVIRONMENTAL FATE AND GROUND WATER ASSESSMENT

Pyridate hydrolyses rapidly (half-lives 66.7, 17.8, and 6.8 hours at pH 5, 7, and 9) to CL-9673. Pyridate photodegrades (unacceptable) in water with a half-life between 10-24 hours, with or without light, indicating that hydrolysis is the main pathway of parent pyridate degradation. In an unacceptable study, CL-9673 had a half-life of 6, 40, and 195 hours, respectively at pH 5, 7 and 9. In another unacceptable study, the half-life of CL-9673 varied from 24 to 840 hours, without sensitizers and pH's from 5 to 9. While in the presence of sensitizers, the half-life of CL-9673 ranged from 24 to 72 hours as pH increased from 5 to 9. In general, CL-9673 was stable in the dark controls, since >93% remained after 35 days. Pyridate photolyzed on soil (unacceptable study) with a half-life of 41 to 59 hours, while 50% of CL-9673 remained on soil after 30 to 60 days.

Aerobic soil metabolism half-life estimates of parent pyridate in two loamy sands (unacceptable study) were reported to be 3-5 days, while half-life estimates of CL-9673 were 47 and 80 days. In an acceptable study utilizing four soils, CL-9673 was reported to degrade under aerobic conditions with half-lives ranging from 10-27 days (**NOTE**: In the May 13, 1986 review, it was erroneously stated that CL-9673, degrades aerobically in the soil with a half-life between 10-30 weeks). Furthermore, 4-16% of the degradation product of CL-9673 in the soils was reported to consist of CL-9673-OMe.

An unacceptable anaerobic soil metabolism study revealed a half-life of 675 days for CL-9673. In the aerobic aquatic metabolism study, which was conducted in the dark,and judged to be supplemental, CL-9673 degraded with a half-life of approximately 75 days; however,since formation and decline of CL-9673 were concurrent, an accurate half-life cannot be calculated. Based on the photodegradation in water study (Study 2), CL-9673 photodegrades rapidly under acidic conditions and in the presence of photosensitizers. Therefore, CL-9673 would be expected to be less persistent under natural conditions then would be concluded from this aerobic aquatic metabolism study.

Based on batch equilibrium studies, it appears that CL-9673 could readily leach (Freundlich K_d values 0.3-3.45). Column leaching studies (partially acceptable) also indicate that pyridate is capable of leaching.

EAB granted a waiver (see EAB review dated 12/15/88), that no further volatility data are required, based on the results of a vapor pressure study which demonstrates a very low volatility of pyridate and its main degradate CL-9673 (pyridate, 7.49×10^{-9} torr and CL-9673, 4.29×10^{-9} torr).

Available data from four unacceptable field dissipation studies indicated that 50% of CL-9673 remained after 12, 28, 29 and 122 days.

The confined accumulation in rotational crops study was not acceptable to the reviewer; however, no residues were detected in lettuce or carrots above the detection limit of 0.01 ppm equivalent CL-9673. Residues were detected in barley straw and grain; the authors attributed the residues (actually ^{14}C) as being incorporated into the cell tissue (ie, carbon pool of the plant).

An unacceptable field accumulation in rotational crops study demonstrated that rotational crops (rape, turnip and ryegrass), planted two weeks and one month after treatment with pyridate at 3 lb ai/A (1.7x of the highest recommended rate) on target crop (corn), did not take up any detectable amounts of residues (<0.03 mg CL-9673/kg). The half-life of the sum of pyridate and CL-9673 in soil was calculated to be about 8 days.

An acceptable fish accumulation study indicates that pyridate plus CL-9673 bioaccumulates in bluegill sunfish with a BCF of 116 for whole fish, but 99% of the accumulated ^{14}C is eliminated from the fish in 14 days upon depuration.

It should be noted that previously reviewed studies that were accepted or rejected have been re-reviewed and their status was not changed from the original conclusions.

Please have the registrant respond to our concerns by submitting all responses under one package and not by submitting the responses separately. This will allow the reviewer to peruse the responses together.

TABLE A. GENERIC DATA REQUIREMENTS FOR PYRIDATE.

Data Requirement	Composition[1]	Use Pattern[2]	Does EPA have data to satisfy this requirement?	Bibliographic Citation	Must additional data be submitted under FIFRA Sec. 3(c)(2)(B)?[3]
40 CFR §158.290 Environmental Fate					
DEGRADATION STUDIES -- LAB:					
161-1. Hydrolysis	PAIRA	A, C	YES	072352[4]	NO
PHOTODEGRADATION:					
161-2. In Water		A, C	NO		YES
161-3. On Soil		A, C	NO		YES
161-4. In Air		A, C	NO		NO[5]
METABOLISM STUDIES:					
162-1. Aerobic Soil	PAIRA	A, C	YES	261827[4,6]	NO
162-2. Anaerobic Soil		A, C	NO		YES
162-3. Anaerobic Aquatic		C	NO		YES
162-4. Aerobic Aquatic		C	NO		YES
MOBILITY STUDIES:					
163-1 Leaching and Adsorption/Desorption	PAIRA	A, C	PARTIAL	072352[4,7]	YES[8]
163-2 Volatility (Lab)		A, C	NO		NO[5]

(Continued, footnotes follow)

TABLE A. GENERIC DATA REQUIREMENTS FOR PYRIDATE.

Data Requirement		Composition	Use Pattern	Does EPA have data to satisfy this requirement?	Bibliographic Citation	Must additional data be submitted under FIFRA Sec. 3(c)(2)(B)?
40 CFR §158.290 Environmental Fate (continued)						
163-3	Volatility (Field)		A, C	NO		NO[5]
DISSIPATION STUDIES -- FIELD:						
164-1	Soil		A, C	NO		YES
164-2	Aquatic (Sediment)		C	NO		YES
164-3	Forestry		NA			NO
164-4	Combination and Tank Mixes		NA			NO
164-5	Soil, Long-Term		A, C	NO		RESERVED[9]
ACCUMULATION STUDIES:						
165-1	Rotational Crops (Confined)		A, C	NO		YES
165-2	Rotational Crops (Field)		A, C	NO		RESERVED[10]
165-3	Irrigated Crops		C	NO		YES
165-4	In Fish	PAIRA	A, C	YES	073283[4]	NO

(Continued, footnotes follow)

TABLE A. GENERIC DATA REQUIREMENTS FOR PYRIDATE.

Data Requirement		Composition	Use Pattern	Does EPA have data to satisfy this requirement?	Bibliographic Citation	Must additional data be submitted under FIFRA Sec. 3(c)(2)(B)?
40 CFR §158.290 Environmental Fate (continued)						
165-5	In Aquatic Non-Target Organisms		C	NO		NO[11]
40 CFR §158.440 Spray Drift						
202-1	Drift Field Evaluation		A, C	NO		RESERVED[12]
202-1	Drift Size Spectrum		A, C	NO		RESERVED[12]

1. TGAI = Technical Grade of the Active Ingredient; PAIRA = Pure Active Ingredient, Radiolabeled; TEP = Typical End Use Product.

2. The use patterns are coded as follows: A = terrestrial food crop; B = terrestrial non-food; C = aquatic food crop (includes rice); D = aquatic non-food; E = greenhouse food crop; F = greenhouse non-food; G = forestry; H = domestic outdoor; I = indoor; J = indirect discharge aquatic use; and NA = not applicable.

3. Data must be submitted no later than _____.

4. Accession number.

5. No data are required because the vapor pressures of pyridate and its degradate CL-9673 are 7.49×10^{-9} and 4.29×10^{-10} Torr, respectively.

6. In the May 13, 1986 review, it was stated that pyridate hydrolyzes rapidly (half-life < 70 hours) to CL-9673, which degrades aerobically in the soil with a half-life between 10-27 days. It was also stated that the major degradation product detected, other than CL-9673, is CL-9673-OMe.

7. Two batch equilibrium studies of the degradate CL-9673, reviewed in the EAB review dated May 13, 1986, can be used to fulfill data requirements; no MRID or accession number is available for either study.

8. Data concerning the mobility of unaged pyridate in four soils, and the mobility of aged pyridate residues in one soil are required for full registration for terrestrial crop uses. In addition, if the registrant seeks to register pyridate for use on rice, a batch equilibrium study of pyridate in an aquatic sediment will be required.

9. This requirement will be imposed if the results from the field dissipation and aerobic soil metabolism studies demonstrate that residues do not reach 50% dissipation in soil prior to the recommended subsequent application.

10. This requirement is deferred pending receipt of acceptable accumulation studies in confined rotational crops.

11. No data are required because the laboratory accumulation in fish study reviewed in the EAB review dated January 30, 1986 indicated that pyridate plus CL-9673 has a BCF in whole bluegill sunfish of 116. In addition, 99% of the accumulated residues were eliminated rom the fish within 14 days upon depuration.

12. Spray drift studies are reserved until toxicity to nontarget animals and plants has been determined.